DOCUMENT RESUME

ED 147 897 CS 501 922

AUTHOR Rogers, Donald P.
TITLE Dubin's Minimal Linkage Construct Revisited.
PUB DATE [76]
NOTE 13p.; Study prepared at State University of New York at Buffalo

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Group Dynamics; Group Structure; *Information Networks; *Information Theory; *Intercommunication; *Organizational Communication; *Organizational Effectiveness; Organizational Theories
IDENTIFIERS Communication Research; *Dubin (Robert)

ABSTRACT

This paper contains a theoretical analysis and empirical study that support the major premise of Robert Dubin's minimal-linkage construct-that restricting communication links increases organizational stability. The theoretical analysis shows that fewer communication links are associated with less uncertainty, more redundancy, and greater stability. In the empirical study, 94 members of six organizational groups provided sealed responses to questions about their organizations' perceived stability and openness of communication; the correlations for the two variables, computed separately for the subjects and for the groups, were negative and statistically significant. The paper concludes that Dubin's major premise seems justified, though caution in its applications is warranted. (RL)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED147897

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Dubin's Minimal Linkage Construct Revisited

Donald P. Rogers

S.U.N.Y. at Buffalo

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Donald P. Rogers

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

CS501 922

Dubin's Minimal Linkage Construct Revisited

In a seminal article on designing organizations for maximum stability, Robert Dubin (1959) introduced the minimal linkage construct. He argued:

> If communication links are more restricted, then the organization will be more stable (M).
>
> If the organization is more stable, then it will be more successful (m).
>
> Therefore, if communication links are more restricted then the organization will be more successful (C).

Within two years Burns and Stalker (1961) had demonstrated that the minor premise of this syllogism did not always hold and, therefore, the conclusion did not always follow. The more stable organization is not necessarily more successful and making an organization more stable does not necessarily make it more successful. Quite the contrary, a stable organization in a dynamic environment can be unable to adapt to change and can become much less successful.

The development of contingency theory, the concept of the organic firm, and the open systems approach led the study of management and organization design to emphasize active concepts like growth, development, change, innovation, and equifinality rather than passive concepts like stability, equilibrium, steady states, and homeostasis. As a result, Dubin's minimal linkage construct has not been well studied. The syllogism has been rejected because of an incomplete minor premise. We do not really know if the major premise can be supported, although laboratory studies of communication nets would lead us to believe that there is some link between restricted communication and stable structure.

The purpose of this paper is to present some theoretical and empirical support for the minimal linkage construct.

THEORETICAL ANALYSIS

Because of the renewed interest in information processing and communication network analysis approaches to organization design, Shannon and Weaver's (1949) mathematical theory of information was employed. From the information theory perspective we would expect that the function of stability in an organization is to reduce the amount of uncertainty in the system, thereby reducing the requisite strategic variety necessary for control and increasing the redundancy and predictability of the system. Given an n person communication network, the question becomes, "What is the relationship between the number of links and the degree of uncertainty -- are fewer links associated with less uncertainty?"

In order to test this question a hypothetical communication network of 50 people (members, nodes) was selected. The number of links for five common linkage patterns were computed. These five linkage patterns were (a) the potential number of links (a completely connected net), (b) the emergent network expected number of links (exponential from the existance of groups, cliques, and coalitions), (c) the random network expected number of links (all linkage patterns are equally probable), (d) the Serial-radial linkage pattern (as in an ideal bureaucracy), and (e) the minimal linkage pattern (a maximally restricted net). Formulas for computing the number of links for each pattern appear in Table 1.

Table 1 about here

For each linkage pattern the absolute and relative uncertainty values were computed. The results of these computations appear in Table 2.

Table 2 about here

As we can see by examining Table 2, there is a direct correlation between number of links, absolute uncertainty of the pattern, and relative uncertainty. More links, more absolute uncertainty, more relative uncertainty are contrasted with fewer links, less absolute uncertainty, and less relative uncertainty. Clearly Dubin's minimal linkage construct is consistent with information theory. Fewer links are associated with less uncertainty, more redundancy, and greater stability. Thus there is theoretical support for the construct.

EMPIRICAL METHODOLOGY

From laboratory studies of communication nets we expect relatively closed groups to organize quickly and to maintain a stable structure. We expect relatively open groups to organize more slowly and to maintain a more flexible structure. Thus we would expect open communication to be inversely related to stable structure. A study was conducted to test that statement. The general design of this study was a correlational analysis of the responses of ninety-four people in six organizational groups to two perceptual measures.

PEOPLE. The people who participated in this study were ninety-four members of six organizational groups. Group one (n = 8) was a academic department in a medium sized college. Group two was also an academic department in a medium sized college (n = 9). Group three (n = 12) was an academic department in a large university. Group four was an administrative department in a medium sized corporation (n = 31). Group six (n = 25) was a local office of a state government agency. Of the ninety-four people, forty-eight

were male; forty-six were female. They ranged in age from nineteen to sixty-four, in organizational tenure from one month to fifteen years, and in educational attainment from tenth grade to Ph.D.

MEASURES. Perceived Open Communication was operationalized as the summed response to a thirty-five item questionnaire derived from Rogers (1976). Perceived Stability was operationalized as a scaled response to the question, "How much do you agree or disagree with the statement -- NOTHING EVER CHANGES IN THIS ORGANIZATION -- as it applies to your department?" In order to test the consistency of the perceptions of the departments, interrater reliability coefficients were computed for with measures. As reported in Table 3, the reliability of each measure is statistically significant at the .001 level of confidence. In order to test the validity of observed differences among departments, correlation ratios were computed for both measures. As reported in Table 3, the discriminate power of each measure is statistically significant at the .001 level of confidence. In addition, as a test of instrument reliability, the Kuder-Richardson

---

Table 3 about here

---

coefficient of equivalence was computed for the Communication Openness Measure. The r of .799 was statistically significant at the .001 level of confidence.

ANALYSIS. Analysis of data was performed on a CDC 6400 computer using library programs for correlation with transgeneration at the State University of New York at Buffalo Academic Computing Center.

RESULTS

Zero order coefficients of correlation between open communication and organizational stability were computed separately for the ninety-four

individuals and six groups participating in this study. As reported in Table 4, the correlation coefficient for the groups is negative and statistically significant at the .01 level of confidence.

Table 4 about here

The correlation coefficient for the individuals is also negative and statistically significant at the .001 level of confidence.

DISCUSSION

We have seen theoretically that fewer communication links are related to less uncertainty and greater stability. We have seen empirically that open communication is inversely related to organizational stability. So what, what does this mean? Obviously this paper supports Dubin's Minimal Linkage Construct. We might be tempted to suggest that in designing organizations for maximum stability the designer should attempt to restrict the communication links. Certainly there are organizations in which stability is important. Manufacturing assembly lines, insurance claims offices, police and military patrols come to mind. But cautions are warranted. First, stability is not an end in itself. Stability performs an instrumental function contributing to organizational success. Stability is desirable when it contributes to performance, satisfaction, or effectiveness. Stability is not desirable if it interfers with performance, effectiveness, or satisfaction. Second, stability cannot be the only goal of an organization. Restricting information flow may improve organizational control, but it reduces adaptability and usually makes innovation and growth less likely. Third, there is a real ethical

question involved in strategically restricting people's freedom to communicate with one another.

In short, Dubin's conclusion and minor premise may not hold, but his argument that fewer communication links increase stability (his major premise) seems justified. We can use Dubin's observation to improve both our theories of organizational communication and our practice of organizational design.

REFERENCES

Burns, T. and G. M. Stalker. The Management of Innovation, Tavistock, 1961.

Dubin, R. "Stability of Human Organizations," in M. Haire, ed. Modern Organization Theory, Wiley, 1959.

Rogers, D. "Specific Communication Behaviors Expected in Relatively Open Organizational Communication Systems," in M. Cassata and R. Palmer, eds. Reader in Library Communication, Microcard, 1976.

Shannon, C. and W. Weaver. The Mathematical Theory of Communication, University of Illinois Press, 1949.

TABLE I

Formulas for Computing the Number of Links
in Specific Linkage Patterns

Maximum Linkage Pattern	= n (n-1) / 2
Expected Linkage Pattern	= n (n-1) / log (n(n-1)
Chance Linkage Pattern	= (n(n-1) / 2) / 2
Serial-Radial Linkage Pattern	= (n-1) log (n-1)
Minimum Linkage Pattern	- n-1

TABLE 2

Uncertainty Values of Various Linkage Patterns in Communication Networks of 50 Nodes

Linkage Pattern	Number of Links	Absolute Uncertainty	Relative Uncertainty
Maximum	1225	9.944	1.00
Expected	722	9.204	.93
Chance	613	8.973	.90
Serial-Radial	83	6.162	.62
Minimum	49	5.442	.55

TABLE 3

Analysis of the Instruments

	Interrater Reliability			Discriminate Validity		
	r	z	p	eta	F	P
Communication	.55	.618	$<.001$	.84	42.64	$<.001$
Stability	.61	.709	$<.001$	.88	58.54	$<.001$

TABLE 4

The Correlation Coefficients

	Coefficients of the 6 Groups		Coefficients of the 94 Individuals	
	r	p	r	p
Communication with Stability	-.97	$<.01$	-.38	$<.001$

D 235 h